RESEARCH / ANALYTICS ADDENDUM

Scope note: The analytics below are derived from the submitted bilateral hand/wrist radiographs only. No feet films, MRI, CT, DEXA, ultrasound, EMG/NCS, laboratory, or external AI inputs were available in this session. Metrics requiring those inputs are marked not available or not computed.

A. Quantitative Radiologic Measures

1) Joint-class structural burden table

Joint class / region	Right	Left	Bilateral total	Structural pattern
Thumb IP joints with definite OA-pattern change	1	1	2	Mild nonerosive degenerative
DIP2-5 joints with definite OA-pattern change	4	4	8	Mild nonerosive degenerative
PIP2-5 joints with subtle trace-mild change	4	4	8	Subtle nonerosive degenerative
Thumb MCP joints with trace spurring only	1	1	2	Minimal/trace degenerative
Thumb-base / triscaphe trace-probable change	1	1	2	Minimal/trace degenerative
MCP2-5 erosive inflammatory involvement	0	0	0	None detected
Wrist/carpal erosive inflammatory involvement	0	0	0	None detected
Definite marginal erosions (all visible hand/wrist joints)	0	0	0	None detected
Ankylosis	0	0	0	None detected
Subluxation / malalignment	0	0	0	None detected

2) Burden summary

- **Definite nonerosive degenerative joint involvement:** 10 joints
  - 2 thumb IP joints
  - 8 DIP joints
- **Additional subtle trace-mild degenerative joint involvement:** up to 8 PIP joints
- **Ancillary trace degenerative foci:** up to 4 sites
  - 2 thumb MCP joints
  - 2 thumb-base/triscaphe sites
- **Definite erosive inflammatory joint count:** 0
- **Carpal erosive count:** 0
- **Malalignment / deformity count:** 0
- **Acute osseous injury count:** 0

3) Severity-class summary

- **Global structural burden:** mild
- **Dominant distribution:** interphalangeal, DIP-predominant with thumb IP involvement
- **Dominant morphology:** nonerosive degenerative
- **Inflammatory erosive burden:** none detected radiographically
- **Wrist inflammatory burden:** none detected radiographically

4) Formal score applicability

- **Full mTSS / Sharp-van der Heijde RA score:** not fully computed in this session
    - reason: hand/wrist-only dataset, no feet series, and no erosive RA-pattern structural burden identified
- **Hand/wrist erosive RA structural score (descriptive):** 0 detected erosive burden on submitted films

B. Longitudinal & Temporal Metrics

1) Time interval

- **Baseline:** xx-Oct-2023
- **Follow-up:** xx-Feb-2026
- **Elapsed interval:** ~27.8 months

2) Delta matrix

Category	xx-Oct-2023	xx-Feb-2026	Delta
Definite erosions	0	0	0
Joints with definite interval JSN worsening	0	0	0
Net osteophyte burden increase	0	0	0
Sclerosis progression	0	0	0
Malalignment / subluxation progression	0	0	0
Ankylosis progression	0	0	0
New deforming inflammatory features	0	0	0
New wrist/carpal inflammatory abnormalities	0	0	0

3) Longitudinal interpretation

- **Temporal class:** stable
- **Progression direction:** none convincing
- **Focal progression:** none detected

- **Global regression:** none detected
- **Sensitivity caveat:** current study has broader projection coverage than prior study, but no convincing additional inflammatory structural abnormality is unmasked

C. Age-Adjusted Reference Context

- **Age at baseline:** 42 years
- **Age at follow-up:** 44 years
- **Image-based contextual note:** no severe age-incongruent destructive arthropathy is visible in the submitted hand/wrist radiographs
- **Formal age-normalization overlay:** not computed in this session
- **Reason:** no external normative engine output was executed within this chat

D. Symmetry & Balance Metrics

1) Bilateral concordance

- **Definite joint-pattern concordance (thumb IP + DIP2-5):** 10/10 matched bilateral counterpart joints
- **Subtle PIP-pattern concordance:** 8/8 matched bilateral counterpart joints
- **MCP2-5 preservation concordance:** preserved bilaterally
- **Wrist preservation concordance:** preserved bilaterally

2) Symmetry interpretation

- **Overall symmetry:** high
- **Side-dominant excess destructive burden:** none
- **Side-dominant inflammatory asymmetry:** none
- **Pattern bias:** symmetric low-burden interphalangeal degenerative profile

E. DEXA–Radiograph Correlation Summary

- **DEXA data:** not available
- **DEXA-linked metrics:** not computed
- **Image-only bone-quality note:** no convincing diffuse juxta-articular osteopenic inflammatory pattern is visible on these radiographs
- **Cross-modal bone-health correlation:** unavailable from current dataset

F. Composite Structural Metrics

Composite descriptor	Result
Structural phenotype	Interphalangeal-predominant nonerosive degenerative profile
Burden class	Mild
Progression class	Stable
Inflammatory erosive class	None detected radiographically
Deformity class	None detected
Wrist inflammatory class	None detected
Mixed-pattern complexity	Low
Confidence on absence of erosive RA-pattern change	High
Confidence on subtle PIP low-grade degenerative change	Moderate to high

G. QA / Reliability Indicators

QA element	Result
Current study adequacy	High
Prior study adequacy	Moderate-high
Laterality certainty	High
Current projection completeness	Stronger than prior
Longitudinal confidence	Moderate-high
Major missingness affecting core interpretation	None in current study
Longitudinal limitation	Prior study has fewer projections
Internal contradiction detected	None

EXPERIMENTAL RESEARCH ADDENDUM

A. Prototype Composite Metrics

Exploratory descriptive metrics; not clinical scores

Prototype metric	Value / class
Definite IP degenerative burden count	10 joints
Additional subtle IP burden count	up to 8 joints
Definite erosive burden count	0
Bilateral matched-pattern concordance	1.00 (complete matched counterpart pattern at definite burden level)
Net structural change count across primary delta domains	0

Prototype metric	Value / class
Exploratory stability class	Stable low-burden pattern
Exploratory drift class	No measurable drift on submitted radiographs

B. Extended Bone-Health Models

- **Extended densitometric / bone-quality modeling:** not computed
- **DEXA absent:** yes
- **Image-only bone-health signal:** no diffuse demineralization pattern, no fragility-fracture pattern, no collapse pattern

C. Infection / Oncologic Advanced Operators

- **Radiographic infection concern:** none detected
- **Radiographic oncologic/destructive concern:** none detected
- **Aggressive lytic or permeative pattern:** absent
- **Periosteal aggressive reaction:** absent
- **Therapy-related destructive bone-change signature:** not identified on the submitted films

D. Advanced Symmetry Maps

- **Hand-to-hand burden mirror:** high
- **Dominant-side excess structural burden:** not demonstrated
- **Asymmetric inflammatory drift:** not demonstrated
- **Asymmetric wrist degeneration:** not demonstrated

E. Genetic / Developmental Modulation

- **Pediatric/developmental module:** not applicable
- **Adult dataset:** yes
- **Congenital/developmental osseous anomaly visible in submitted hands/wrists:** none definite

F. External AI Integration Hooks

- **Third-party model inputs:** none
- **Cross-modal fusion:** none
- **External provenance signals:** none available in this session

G. QA & Data Integrity Extensions

Data-integrity item	Result
Current dataset completeness	Adequate
Prior dataset completeness	Limited but adequate for comparison
Cross-date interpretive consistency	High
Missing advanced modality inputs	DEXA/MRI/CT/US/EMG absent
Research-only limitation	Full formal multimodal analytics cannot be executed without external inputs
Clinical-core integrity	Preserved; no change introduced by research layer

Overall research-tier summary:
Image-derived analytics support a **stable, mild, symmetric, interphalangeal-predominant nonerosive degenerative pattern** without radiographic evidence of erosive inflammatory hand/wrist progression over ~27.8 months. No destructive RA-pattern structural burden is demonstrated on the submitted studies.